Claims:

What is claimed is:

1. An isolated *dwf4* polynucleotide comprising an open reading frame encoding a polypeptide comprising (i) a sequence having greater than 43% identity to the amino acid sequence of SEQUENCE ID NO:2; (ii) a sequence comprising at least about 10 contiguous amino acids that have greater than 43% identity to 10 contiguous amino acids of SEQUENCE ID NO:2, or a complement or reverse complement of said polynucleotide.

2. The isolated *dwf4* polynucleotide of claim 1 wherein the polynucleotide has at least 70% identity to the DWF4 polypeptide-coding region of SEQ ID NO:1, complements and reverse complements thereof.

3. The isolated *dwf4* polynucleotide of claim 1 comprising the nucleotide sequence of SEQ ID NO:1, complements and reverse complements thereof.

4. The polynucleotide of claim 1 comprising at least 30 consecutive nucleotides of SEQ ID NO:1.

5. An isolated *dwf4* polynucleotide comprising (i) a sequence having at least 50% identity to SEQ ID NO:1, complements and reverse complements thereof or (ii) a sequence comprising at least about 15 contiguous nucleotides that has at least 50% identity to SEQ ID NO:1, complements and reverse complements thereof.

6. The isolated *dwf4* polynucleotide of claim 5 having at least 50% identity to the DWF4 polypeptide-coding region of SEQ ID NO:1, complements and reverse complements thereof.

7. The isolated *dwf4* polynucleotide of claim 5, comprising the nucleotide sequence of SEQ ID NO:1, complements and reverse complements thereof.

8. The polynucleotide of claim 5 comprising at least 30 consecutive nucleotides of SEQ ID NO:1.

9. The isolated polynucleotide of claim 5, wherein the polynucleotide is genomic DNA.

10. The isolated polynucleotide of claim 5, wherein the polynucleotide includes introns.

11. A recombinant vector comprising (i) the polynucleotide of claim 1; and (ii) control elements operably linked to said polynucleotide whereby a coding sequence within said polynucleotide can be transcribed and translated in a host cell.

12. A recombinant vector comprising (i) the polynucleotide of claim 5; and (ii) control elements operably linked to said polynucleotide whereby a coding sequence within said polynucleotide can be transcribed and translated in a host cell.

13. A host cell comprising the recombinant vector of claim 11.

14. A host cell comprising the recombinant vector of claim 12.

15. A method of modulating a DWF4 polypeptide comprising the following steps:
(a) providing a host cell according to claim 14; and
(b) culturing said host cell under conditions whereby the *dwf4* polynucleotide is transcribed.

16. The method of claim 15, wherein the *dwf4* polynucleotide is overexpressed.

17. The method of claim 15, wherein expression of *dwf4* is inhibited.

18. A transgenic plant comprising the recombinant vector of claim 11.

19. A transgenic plant comprising the recombinant vector of claim 12.

20. The isolated polynucleotide of claim 5, wherein the polynucleotide includes a *dwf4* control element comprising a polynucleotide selected from the group consisting of (i) a sequence having at least 50% identity to nucleotides 1 to 3202 of SEQ ID NO:1; (ii) a fragment of (i) which includes a *dwf4* control element; and (iii) complements and reverse complements of (i) or (ii).

21. The isolated polynucleotide of claim 5, wherein the polynucleotide includes a *dwf4* control element comprising a polynucleotide selected from the group consisting of (i) a sequence having at least 50% identity to nucleotides 6111 to 6468 corresponding to the 3' UTR of SEQ ID NO:1; (ii) a fragment of (i) which includes a *dwf4* 3' UTR; and (iii) complements and reverse complements of (i) or (ii).

22. The isolated polynucleotide of claim 5, where in the polynucleotide includes a *dwf4* control element comprising a polynucleotide selected from the group consisting of (i) a sequence having at least 50% identity to the sequences corresponding to the introns of SEQ ID NO:1; (ii) a fragment of (i) which includes a *dwf4* intro; and (iii) complements and reverse complements of (i) and (ii).

23. The isolated polynucleotide of claim 22, wherein the introns are selected from the group consisting of nucleotides 3424 to 3503 of SEQ ID NO:1; nucleotides 3829 to 3913 of SEQ ID NO:1; nucleotides 4067 to 4164 of SEQ ID NO:1; nucleotides 4480 to 4531 of SEQ ID NO:1; nucleotides 4725 to 4815 of SEQ ID NO:1; nucleotides 4895 to 5000 of SEQ ID NO:1; and nucleotides 5111 to 5864 of SEQ ID NO:1.

24. A recombinant vector comprising:

(a) the isolated polynucleotide which includes a *dwf4* control element of claim 20; and

(b) a nucleic acid molecule comprising a coding sequence.

25. A host cell transformed with the recombinant vector of claim 24.

26. A method of producing a recombinant polypeptide comprising the following steps:

(a) providing a host cell according to claim 25; and

(b) culturing said host cell under conditions whereby the recombinant polypeptide encoded by the coding sequence present in said recombinant vector is expressed.

27. A method of producing a transgenic plant comprising the steps of:

(a) introducing the polynucleotide of claim 5 into a plant cell to produce a transformed plant cell; and

(b) producing a transgenic plant from the transformed plant cell.

28. A method for producing a transgenic plant having an altered phenotype relative to the wild-type plant comprising the following steps:

introducing at least one polynucleotide of claim 5 into a plant cell; and

producing a transgenic plant from the plant cell, said transgenic plant having an altered phenotype relative to the wild-type plant.

29. The method of claim 26, wherein the phenotype is selected from the group consisting of altered cell length, altered periods of flowering, altered branching, altered seed production, altered leaf size, elongated hypocotyls, altered plant height, altered heme-thiolate enzyme activity, altered monooxygenase activity, altered 22α-hydroxylase activity, regulation of brassinosteriods, regulation of gibberellic acid, regulation of cytokinins, regulation of auxins, altered resistance to plant pathogens, altered growth at low temperatures, altered growth in dark conditions, and altered sterol composition.

30. The method of claim 28, wherein the phenotype is increased seed production.

31. The method of claim 28, wherein the phenotype is increased plant height.

32. The method of claim 28, wherein the phenotype is increased leaf size.

33. The method of claim 28, wherein the phenotype is altered 22α-hydroxylase activity.

34. The method of claim 28, wherein the polynucleotide is operably linked to a promoter selected from the group consisting of a tissue-specific promoter, an inducible promoter or a constitutive promoter.

35. The method of claim 28, wherein the polynucleotide is overexpressed.

36. The method of claim 28, wherein the polynucleotide inhibits expression of *dwf4*.

37. The method of claim 28, wherein at least first and second polynucleotides are introduced into the plant cell, said first and second polynucleotides operably linked to at least first and second tissue-specific promoters, wherein said first polynucleotide is overexpressed and said second polynucleotide inhibits expression of *dwf4*.

38. A method for altering the biochemical activity of a cell comprising the following steps:

introducing at least one polynucleotide of claim 5 into the cell; and

culturing the cell under conditions such that the biochemical activity of the cell is altered.

39. The method of claim 38, wherein the biochemical activity is selected from the group consisting altered heme-thiolate enzyme activity, altered monooxygenase activity, altered 22α-hydroxylase activity, regulation of gibberellic acid, regulation of cytokinins, regulation of auxins, and altered sterol composition.

40. The method of claim 39, wherein the cell is cultured *ex vivo*.

41. The method of claim 39, wherein the *dwf4* polynucleotide is provided to the

cell *in vivo*.

42. The method of claim 39, wherein more than one *dwf4* polynucleotides are provided to the cell.

43. A method of transforming a host cell comprising the step of introducing into said cell the recombinant vector of claim 14.

44. The method of claim 43, wherein the host cell is cultured *ex vivo*.

45. The method of claim 43, wherein the *dwf4* polynucleotide is provided *in vivo*.

46. A method for regulating the cell cycle of a plant cell comprising the following steps:

providing a *dwf4* polynucleotide to a plant cell; and

expressing the *dwf4* polynucleotide to provide a DWF4 polypeptide, wherein the DWF4 polypeptide is provided in amounts such that cell cycling is regulated.

47. The method of claim 46, wherein the plant cell is provided *in vitro* and is cultured under conditions suitable for providing the DWF4 polypeptide.

48. The method of claim 46, wherein the *dwf4* polynucleotide is provided *in vivo*.

49. A method of according to claim 25, wherein the DWF4 polypeptide is provided in amounts such that a plant is regenerated.

50. The method of claim 49, wherein the plant cell cultured *ex vivo*.

51. The method of claim 49, wherein the *dwf4* polynucleotide is provided *in vivo*.

52. An isolated DWF4 polypeptide comprising (i) a sequence having greater than 43% identity to SEQ ID NO:2 or (ii) fragments of (i) that confer a DWF4 phenotype

when expressed in a host organism.

53. The isolated DWF4 polypeptide of claim 52 comprising the amino acid sequence of SEQ ID NO:2.

54. An isolated polynucleotide comprising a polynucleotide according to claim 5 operably linked to a nucleic acid molecule encoding a heterologous polypeptide.

55. The polynucleotide of claim 54 wherein the heterologous polypeptide is a cytochrome P450 polypeptide.

56. A chimeric polypeptide comprising a DWF4 polypeptide according to claim 52 and a heterologous polypeptide.

57. The chimeric polypeptide of claim 56 wherein the heterologous polypeptide is a cytochrome P450 polypeptide.